

## CLAIMS.

We claim

1. A method of wireless data exchange amongst ad-hoc mobile devices of limited range within a communications network, the network comprising a plurality of mobile units including a source mobile unit and a destination mobile unit and a plurality of wireless communication links wirelessly connecting together, each said mobile unit and communication link comprising data communication means and data processing means, the said method comprising
  - a special communicative method, comprising protocol supporting a plurality of tasks in connection with ad-hoc network abilities (hereinafter CYRF protocol);
  - a special communicative method, comprising protocol supporting a plurality of tasks on global communications (GLOBAL MESSAGE TRANSPORT) (hereinafter GMT);the said CYRF communicative protocol further comprising
  - a routing method for providing data exchange among devices in network,
  - a frequency division multiple access method,
  - an registration data broadcasting method,
  - RF output power control method,
  - fail-safe file system management method;the said GLOBAL MESSAGE TRANSPORT (GMT) further comprising
  - special interfaces for data transfer amongst mobile devices and to/from global network.
2. The routing method of claim 1, for providing data exchange among devices in network further comprising:
  - collection of neighbors' identifying information into mobile units' internal tables.
  - search and selection of communication route,
  - settlement of connection along the selected route,
  - deletion of the route information after the session;

wherein collection of neighbors' identifying information  
into mobile units' internal tables comprises

- periodically transmitting an identifier signal by each of said plurality of mobile units in the network and receiving said identifier signals via said communication links between said mobile units,
- adding to internal tables identifying information about closest neighbors;

wherein said step of search and selection of communications route comprises

- transmitting broadcast query signals from the source mobile unit across the network,
- appending route information to the broadcast query signals relating the status of mobile units transmitting the broadcast query signals,
- receiving the broadcast query signals at the destination mobile unit,
- selecting a route through the network that was first received by destination mobile unit,
- transmitting a route identifier signal along every route through the network from the destination mobile unit to the source mobile unit, and
- transmitting an information packet from said source mobile unit across said network via said selected communications route to said destination mobile unit.

3. A routing method of claim 2, wherein said communications links comprises various types of communication links, including wireless (radio frequency and infrared) and wired (LAN, serial and USB) links.

4. A routing method of claim 2, further comprising periodically transmitting a mapping signal consisting of random set of known identifiers of associated mobile units by each of said plurality of mobile units in the network and receiving

said mapping signals via said communication links between said mobile units;

5 5. A routing method of claim 2, further comprising adding to internal table at each mobile unit and regularly updating an information about the signal quality of each communication mobile unit and of its associated mobile units,

10 6. A routing method of claim 2, further comprising storing in said internal table information regarding associated mobile units not having direct connection to the mobile unit but with information about a mobile unit that is intermediate for the destination.

15 7. A routing method of claim 2, wherein the network supports a plurality of selected routes between respective source and destination mobile units, each mobile unit in the network being able to handle a plurality of selected routes and being able to store route relaying load information regarding the total number of selected routes supported by said mobile unit.

8. A routing method of claim 2, further comprising:  
- providing a seen table at each mobile unit, said seen table  
20 recording identifier data regarding an information packet which has passed through said mobile unit; and  
- using said seen table to recognize and discard information packets that have previously been passed through said mobile unit.

25 9. A routing method of claim 2, wherein said information is provided in data packets, each data packet being arranged to hold routing information, control information and message information.

30 10. A routing method of claim 2, further comprising providing a data flow acknowledgment mechanism comprising acknowledgments, each said acknowledgment comprising receiving at a mobile unit an information packet previously sent by the mobile unit to one of its associated mobile units and retransmitted back thereby.

11. A routing method of claim 10, further comprising retransmitting said previously sent signal from said mobile unit to said associated mobile unit if an acknowledgment is not received within a predetermined time out period.

5 12. A routing method of claim 2, further comprising:  
- estimation of quality of service said communication links,  
- appending quality of service information to the broadcast query signals, the quality of service information containing criteria on route selection which are taken into account on  
10 selecting a route through the network.

13. A routing method of claim 2, further comprising using of mapping table for sending route request directly to associated mobile device that is registered in said mapping table as an intermediate node to destination mobile device  
15 instead of broadcasting said request.

14. A routing method of claim 2, further comprising reconstructing the selected route in response to a change in the quality of one said communication links indicating a broken communication link invalidating the selected route.

20 15. A routing method of claim 14, wherein said step of reconstructing the selected route comprises:  
- identifying a pivot mobile unit in the selected communications route adjacent the broken communication link;  
- transmitting a localized query signal from the pivot mobile  
25 unit across the network;  
- appending route information to the localized query signal regarding the status of mobile units passing the localized query signal;  
- receiving and evaluating the localized query signals at the  
30 destination mobile unit;  
- searching an adjacent mobile units being parts of a safe alternative routes, having the same source and destination units;  
- selecting among plurality of possible alternative routes;

- transmitting the information packet from said pivot mobile unit to the destination mobile unit via part of alternative route;
- using the alternative route for further information exchange.

16. A routing method of claim 15, further comprising appending quality of service information to the localized query signal, the quality of service information containing criteria on route selection, which are taken into account on selecting a route through the network.

17. A routing method of claim 11, wherein said step of reconstructing the selected route comprises:

- transmitting broadcast query signals from the source mobile unit across the network;
- appending route information to the broadcast query signals regarding the status of mobile units passing the broadcast query signals;
- receiving and evaluating the broadcast query signals at the destination mobile unit;
- selecting a route through the network that was first received by destination mobile unit;
- transmitting a route identifier signal along the selected route through the network to the source mobile unit.

18. A routing method of claim 17, further comprising:

- appending quality of service information to the broadcast query signals, the quality of service information containing criteria on route selection which are taken into account on selecting a route through the network.

19. A routing method of claim 16, wherein transmitting broadcast query signals from the source mobile unit across the network is repeated until the destination mobile unit either receives the localized query signal or the broadcast query signal.

20. A routing method of claim 2, wherein said routing method is arranged for use with fixed base station wireless local area networks.

21. A method of claim 1, wherein mobile units operating  
5 within the fixed frequency band, providing the division of all or a part of said frequency band into two or more frequency channels (sub-bands), one of which is considered as base channel, and the others - as operative channels, wherein all the variety of possible applications or tasks to be processed  
10 is preliminarily assigned on at least one channel, and one channel is being assigned to use for processing only account data of all the plurality of devices in network.

22. A method of claim 21, wherein every kind of application or task is being assigned among assigned channels,  
15 so that for every channel is assigned one or more type of application or task.

23. A method of claims 21, 22, wherein the job is processed by the following steps:

- every device periodically broadcasts its own account data;
- 20 - every device periodically collects account data about other communication devices within the accessible range on the specially assigned channel for account data exchange;
- the channel assigned for this type of job is being selected and occupied;
- 25 - to take part in joint job the devices switched to the channel where this job is currently being processed;

24. A method of claims 21-23, wherein for every radio communication mean is preliminarily assigned an identification number (ID).

30 25. A method of claims 21-24, wherein account data includes at least device ID plus current occupied operative channel number.

26. A method of claims 21-25, wherein for the account data storage about the adjacent devices in range, a special  
35 internal device-channel list is organized in the device's memo.

27. A method of claim 21, wherein if for a specific type of job is assigned more then one channel, and at least one of the channels is occupied by other application, then the next not occupied channel number in the channel-job list is selected  
5 as an operative channel.

28. A method of claim 23, wherein for every type of job is assigned at least one operative channel.

29. A method of claims 21-28, wherein for every operative channel is assigned at least one type of application.

10 30. A method of claims 21-29, wherein every device periodically transfers and receives account data on the base channel.

31. A method of claims 21-30, wherein the list of currently accessible devices is being periodically refreshed.

15 32. A method of claim 1, wherein signal output power control further comprising the next steps

- at least two levels differing in output power are preliminary assigned,

- quality estimation of received signal,

20 wherein

- preliminarily assigning the connection signal quality levels (RSSI) (Received Signal Strength Indicator), the comparison of received signal with said quality levels is the base for output power changes,

25 - quality estimation is being carried out on each data receive session.

33. The method of claim 32, wherein two levels of output are assigned, differing in power -regular power level and extra power level, higher then the said regular power level.

30 34. The method of claim 32 and 33, wherein preliminary assigned at least two levels for received signal power (RSSI) - level 1 assumed as lower level of receiving signal satisfactorily quality, level 2 assumed as upper level for receiving signal.

35. The method of claim 34, wherein quality level is estimated during each data receive session.

36. The method of claim 34, wherein the regularity and quality level (RSSI) of receiving ping-signal (identification  
5 signal) is assumed as additional information on connection quality.

37. The method of claim 34, wherein additional information field is included in the heading format of receiving information packet, and the value of said information  
10 field indicates the necessary output power level for information exchange between communicated devices.

38. A method of claim 34, wherein accessible devices list format contains a special field for indicating the necessary output power level for communication with each device.

15 39. A GMT method of claim 1, wherein

- in mobile network, the network additionally comprising a device, wirelessly connected to mobile devices in said network, and connected by wire to the global network;
- said device, device further comprising means for data  
20 storage, found into global network all known identical devices and inform them about accessible mobile devices in its neighborhood in mobile network;
- said device collected the information about accessible mobile devices from all known identical devices;
- 25 - said device transfers messages to any addresses outside mobile network to accessible mobile devices in global network and back;
- said device stores messages addressed to devices not accessible at that moment;

30 40. A fail-safe file system management method of claim 1, further comprising

- dividing all the data carrier into a number of blocks equal in size and format,



- said block format including a block logical ID number; belonging to a file identifier, containing at least file name; fullness with data identifier; data field.

- 41. A method of claim 40, wherein file identifier
- 5 additionally contains file creation date and file access attributes.
- 42. A method of a.m. claims, wherein as data processing means are represented by computers.
- 43. A method of a.m. claims, wherein as communication
- 10 means are represented by RF transceivers